CYPRESS SAVANNA (TYPIC SUBTYPE)

Concept: Cypress Savannas are wetlands of flat-bottomed depressions, typically clay-based Carolina bays, with dense, diverse herbaceous layers. A canopy of *Taxodium ascendens* is usually present but trees may be absent. Cypress Savannas are intermediate in wetness between Vernal Pools and Small Depression Pond communities, so overlap in hydroperiod with Small Depression Drawdown Meadows; however, their vegetation and flora are different. Water typically stands well into the growing season but disappears from the surface in all but the wettest year. The hydroperiod is too short to support floating or emergent aquatic plants on a long-term basis, and too wet to support trees other than *Taxodium ascendens* and *Nyssa biflora* on a long-term basis under natural conditions.

The Typic Subtype covers examples with diverse herb layers of species typical of mineral soils. Boggy species such as *Woodwardia virginica* and *Carex striata* may be present but are not strongly dominant. The Typic Subtype generally supports a diverse mixture of plants that emerge when water goes down and those that grow in the water, but the vegetation may vary drastically from year to year.

Distinguishing Features: Cypress Savannas are distinguished from Vernal Pools by the absence of less flood-tolerant plants such as *Panicum virgatum* and *Schizachyrium scoparium*. Other more upland species, such as *Andropogon virginicus, Andropogon capillipes, Andropogon glaucopsis, Eupatorium compositifolium, Eupatorium album*, and *Pinus taeda,* may invade during droughts but are not present most of the time in the interior of the community. Cypress Savannas are distinguished from most subtypes of Small Depression Pond by lacking plants indicative of longer term inundation. They may include some of the more broadly tolerant emergent species, such as *Panicum hemitomon* and *Leersia hexandra* but will lack true aquatics and the more restricted emergents such as *Eleocharis equisetoides, Rhynchospora tracyi*, and *Rhynchospora inundata*.

Small Depression Drawdown Meadows may share some plants with Cypress Savanna communities, but overall flora will differ. Plants that are characteristic of Cypress Savanna and uncommon in Small Depression Drawdown Meadow include *Coelorachis rugosa, Eriocaulon compressum, Saccharum giganteum, Diodia virginiana,* and *Hypericum cistifolium*. Plants characteristic of the Small Depression Drawdown Meadows and not of Cypress Savannas include *Centella erecta, Lachnanthes caroliniana, Panicum tenerum, Juncus pelocarpa (abortivus)*, and *Proserpinaca pectinata*. Some plant species, such as *Dichanthelium erectifolium, Dichanthelium wrightianum, Polygala cymosa, Rhexia aristosa, Pluchea baccharis (rosea), Scleria reticularis, Eupatorium leucolepis,* and *Panicum verrucosum*, may be frequent in either subtype. Distinguishing these communities is made more difficult by the fact that dominant plants and aspect dominants may very drastically from year to year, depending on rainfall.

The Typic Subtype is distinguished from the Acidic Subtype by a diverse and characteristic herbaceous flora that is not dominated by boggy species. In the Acidic Subtype, *Woodwardia virginica, Carex striata, Sphagnum,* and a few other extremely acid-tolerant species dominate. These species may be present in the Typic Subtype but do not dominate.

Presence or absence of *Taxodium ascendens* is not a reliable characteristic for distinguishing

among these communities. Natural patterns of tree abundance are believed to be confused by long-lasting effects of past logging and potentially of fire exclusion. Cypress Savannas usually have an open but substantial canopy of *Taxodium ascendens*; a few examples have sparse or no trees but are otherwise identical. Most Small Depression Drawdown Meadows have no trees or only sparse trees, which are as likely to be *Nyssa biflora* as *Taxodium* but they may locally have a more substantial canopy. A denser canopy dominated by *Taxodium ascendens* or *Nyssa biflora* indicates Small Depression Swamp.

Synonyms: *Taxodium ascendens / Panicum hemitomon - Polygala cymosa* Woodland (CEGL003733). Cypress Savanna (Typic and Depression Meadow variants) (3rd Approximation) (in part). Small Depression Drawdown Meadow/Savanna (Typic Cypress Savanna Subtype) (earlier 4th approximation guide drafts).
Ecological Systems: Atlantic Coastal Plain Clay-Based Carolina Bay Wetland (CES203.245).

Sites: Cypress Savannas are predominantly in clay-based Carolina bays – small to medium size, middle to inner Coastal Plain Carolina bays mineral soils. A few examples are known in shallow, flat-bottomed limesink depressions or swales on high river terraces.

Soils: Soils of most examples are wet Ultisols. McColl (Typic Fragiaquult) is mapped for more than half of the known examples. Pantego (Umbric Paleaquult), Coxville (Typic Paleaquult), and Rains (Typic Paleaquult) are mapped in several examples. The one river terrace example is mapped as Johns (Aquic Hapludult). The term "clay-based" has been used by ecologists for these sites for many years. It refers to the fragipan that is found in many examples, which restricts water penetration when wet. It appears that not all Cypress Savanna soils have a fragipan, and its importance to their occurrences is not well known.

Hydrology: Cypress Savannas have surface water of shallow-to-moderate depth, a few inches to a couple of feet, in times of normal rainfall. Surface water typically persists well into the growing season but is gone before the end of summer in ordinary years. However, water levels and hydroperiods vary substantially in response to weather cycles. Examples have been known to remain dry for periods of years or to stay flooded through whole years. The relatively flat bottom of the basins leads to similar water levels over large areas, in contrast to more sloping depressions where zones of a given water depth may shift but remain present somewhere in the basin.

Carolina bays generally have little local watershed, so most of the water that floods them may come from rainfall. It is not well known how closely the hydrology of these depressions is linked to ground water. Because they have an impermeable clay layer, water presumably is perched when the water table is low, even if it connected to the water table at wetter times.

Vegetation: Cypress Savanna (Typic Subtype) usually has an open canopy of *Taxodium ascendens*, though trees can range from absent or sparse to fairly dense. The thin crowns of this species cast limited shade even at fairly high densities. Some *Nyssa biflora* may be present. *Pinus taeda*, generally smaller individuals, is often present in examples and is sometimes dense. It is believed to be an invader not characteristic of more natural conditions. The herb layer is dense and often diverse when water levels are down. Dominants can vary from time to time. Species that are at least fairly frequent in plots and sometimes dominant include *Dichanthelium*

wrightianum, Rhexia aristosa, Scleria reticularis, Scleria muhlenbergii, Rhynchospora inundata, Rhynchospora filifolia, Eupatorium leucolepis, Eupatorium paludicola, Kellochloa (Panicum) verrucosa, Pluchea baccharis (rosea), Boltonia asteroidies, and *Eleocharis tricostata*. Species fairly frequent in plots and sometimes abundant include *Sclerolepis uniflora, Rhynchospora perplexa, Eriocaulon compressum, Erianthis giganteus, Diodia virginiana, Euthamia caroliniana, Lachnanthes caroliniana,* and *Hymenachne hemitomon*. The latter two species, though occasionally abundant, are almost never as abundant as they often are in Small Depression Drawdown Meadow or Small Depression Pond communities. Other herbs sometimes reported to be abundant include *Centella erecta, Coelorachis rugosa, Hypericum cistifolium, Coleataenia longifolia* var. combsii *(Panicum rigidulum* var. *combsii), Proserpinaca pectinata, Rhynchospora perplexa, Dichanthelium erectifolium, Sabatia difformis,* and *Sagittaria isoetiformis,* though some of these species too are much more frequent in other communities. *Andropogon virginicus* or other *Andropogon* species, *Eupatorium capillifolium*, and other upland species may appear during drought periods. Shrubs are generally sparse and mostly limited to tree bases, cypress knees, and other raised microsites except on the edge. Species may include *Vaccinium fuscatum, Vaccinium formosum, Ilex amelanchier, Cyrilla racemiflora, Eubotrys racemosa, Ilex glabra, Morella cerifera*, or other species. *Smilax rotundifolia* may form dense tangle on the edge, and it or other vines such as *Muscadinia rotundifolia* may root in drier microsites.

Range and Abundance: Ranked G2G3. In North Carolina examples are concentrated in the southern inner Coastal Plain outside of the Sandhills region, with most in Robeson, Hoke, and Scotland counties. They once were fairly common there, but remaining intact examples are rare. Scattered examples occur farther east. This community is more abundant in South Carolina, though there too intact examples are rare. It is questionably attributed to Georgia.

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Associations and Patterns: Cypress Savannas tend to fill entire basins, though a Small Depression Shrub Border may be present on the edge. They naturally were surrounded by upland longleaf pine communities but virtually no remaining examples have natural surroundings.

Variation: The Typic Subtype appears highly variable. Two variants are tentatively recognized at this time, but more likely could be recognized.

1. Inland Variant occurs in the inner Coastal Plain, in the areas where clay-based Carolina bays are most common. It fits most of the above description and applies to most examples known.
2. Outer Coastal Plain Variant covers the few examples known in that region, which occur in depressions other than Carolina bays and have floristic differences that may represent either biography or the different environment. Species in this variant that are scarce or absent in plot data for the Inland Variant include *Andropogon glaucopsis, Centella erecta, Eupatorium mohrii, Aristida palustris, Coleataenia tenera, Polygala ramosa,* and *Sagittaria subulata.*

More variants may be warranted, perhaps for the few middle Coastal Plain examples, perhaps for different grouping in the Inland Variant. Temporal variation in vegetation makes it difficult to sort out enduring differences among sites. Changes caused by alteration of hydrology and exclusion of fire also have confused understanding of natural variation more than in most communities. The 3rd Approximation recognized Typic and Depression Meadow variants of Cypress Savanna, based largely on the presence or absence of a *Taxodium* canopy or evidence of one in the recent past. Nifong (1998) found only minor floristic differences between the two; he believed that those

without canopy had once had trees. These variants have been dropped, though a different breakdown of variants may be warranted.

Cypress Savanna (Typic Subtype) equates primarily to the Nifong (1998) categories called subclass 9.2, Cypress-Gum Pond, 9.3, Drawdown Savanna/Meadow, and some of 9.4, Wet Savanna/Meadow. However, he noted that the deeply flooded Cypress-Gum Ponds probably were a temporal subclass of Drawdown Savanna/Meadows. He suggested that the Wet Savanna/Meadow subclass had a more stable hydroperiod and was dominated by longer-lived plants. This warrants further investigation. Nifong (1998) recognized multiple further divisions in each subclass, most of them known from only a single site and often from closely spaced plots. Understanding of the complex patterns within Cypress Savannas may await both extensive studies that compare sites under uniform weather conditions and additional site-specific studies that provide details of temporal changes.

Dynamics: Cypress Savanna vegetation, presumably fauna and ecosystem processes as well, vary drastically among years and over periods of years in response to changing hydroperiods. Because conditions are more uniform than in steeper-sided basins, the changes are more likely to appear as complete changes in dominants rather than as short-distance shifting of zones. Long-lived seed banks are extremely important in Cypress Savannas, apparently more so than in any other community in North Carolina. Species unseen for years may abruptly reappear in abundance when conditions change, and such species have at times been found in dormant seed banks (Kirkman and Sharitz 1994)

Among Coastal Plain Depression Communities, fire appears particularly important in Cypress Savannas. The invasion by *Pinus taeda* and *Liquidambar styraciflua* in dry periods and subsequent persistence is most pronounced in them, and fire was the likely natural mechanism keeping it in check. Some good examples of Cypress Savanna have seen substantial ecological alteration by this process.

The woody vegetation of Cypress Savannas is necessarily more stable than the herb layer. While *Taxodium ascendens* trees are not usually large, they may be old. Mature trees are tolerant of fire and could readily survive dry periods. Opportunities for reproduction of *Taxodium* may have been limited, leading to an age structure with only a few widely separated cohorts. Observations of older aerial photography suggest that tree density and cover often is stable over decades (Peroni 1988). Alterations in the tree component also can be stable. Examples with old stumps but no trees can be observed. Nifong (1998) and other observers have suggested that the treeless depression meadows that show no evidence of stumps nevertheless once had trees that were removed.

Comments: Despite long interest of the land conservation community, the classification of Cypress Savannas and related depressional wetlands has been among the most difficult to work out for this document. Early drafts of the 4th Approximation tried several different approaches, including treating them together with Small Depression Drawdown Meadow and tentative recognition of a separate Depression Meadow type. In the end the classification has returned to something more similar to that used in the 3rd Approximation, with the added recognition of the Acidic Subtype as distinct. Inner Coastal Plain areas called Depression Meadows are treated as

Cypress Savannas, but many treeless outer Coastal Plain depressions that were called Depression Meadow fit better into the Small Depression Drawdown Meadow type.

Rare species: Vascular plants: *Agalinis virgata, Amphicarpum muhlenbergianum, Boltonia asteroides* var. *glastifolia, Carex verrucosa, Dichanthelium hirstii, Eleocharis atropurpurea, Eleocharis robbinsii, Eupatorium leptophyllum, Eupatorium paludicola, Gratiola ramosa, Helianthium tenellum, Iva microcephala, Lobelia boykinii, Ludwigia suffruticosa, Muhlenbergia torreyana, Oldenlandia boscii, Oxypolis canbyi, Paspalum dissectum, Persicaria hirsuta, Rhexia aristosa, Rhynchospora harperi, Rhynchospora microcarpa, Rhynchospora tracyi, Sagittaria isoetiformis, Scleria reticularis, Sclerolepis uniflora, Solidago leavenworthii, Stylisma aquatica, Tridens ambigua,* and *Utricularia cornuta.*

Vertebrate animals: *Ambystoma mabeii, Ambystoma tigrinum, Rana capito, Pseuacris ornata, Deirochelys reticularia reticularia, Eurycea quadridigitata, Pseudacris nigrita,* and *Liodites rigida.*

Invertebrate animals: *Lynceus gracilicornis.*

References:

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